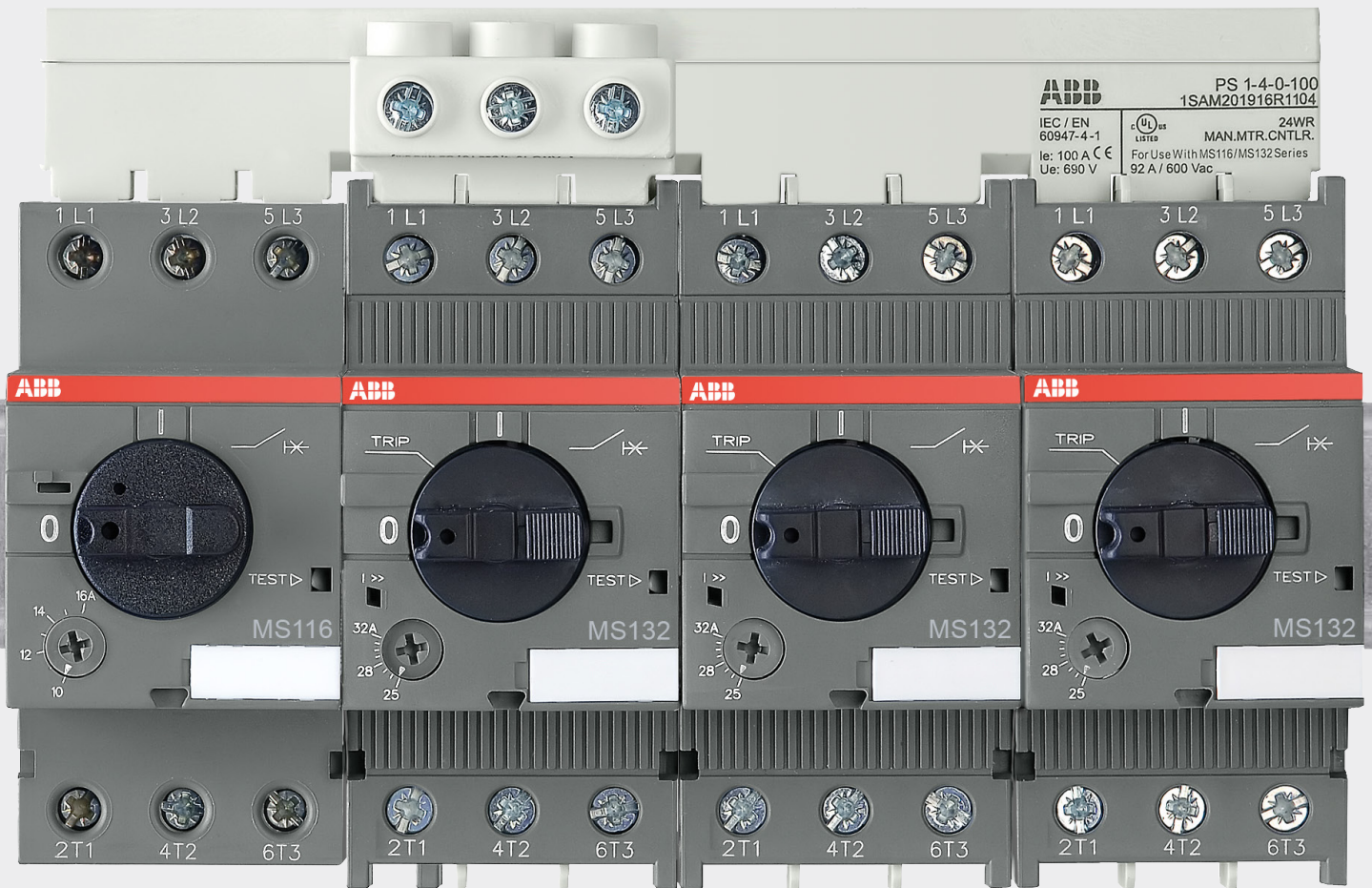


APPLICATION NOTE

# Manual motor starters

## High temperatures and group mounting



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**ABB offers a wide range of manual motor starters, also known as motor protective circuit-breakers.**

**This application note provides information to aid in the proper use of manual motor starters in high temperature environments and in group installations.**

# General information

## Group mounting and temperature

ABB's manual motor starters are designed to meet and exceed requirements of relevant product standards IEC 60947-2, IEC 60947-4-1 as well as UL 60947-4-1 and CAN/CSA-C22.2 no. 60947-4-1.



### Requirements from standards

According to these applicable product standards it is required to test and validate relevant electrical and mechanical data (e.g. rated currents, rated frequencies, rated voltages etc.), typically at operating ambient air temperatures of -5 °C up to max. 40 °C.



### ABB manual motor starters exceed standards

ABB's manual motor starters exceed this requirement by allowing compensated<sup>1)</sup> operation in ambient temperature ranges for single mounted products in IEC applications of -25 °C up to 60 °C (55 °C for MS116). Derated<sup>2)</sup> values for the upper limit of the current setting range for ambient temperatures up to 70 °C, for group mounted products and for UL applications are shown in the following tables. Values between the temperature values can be linear interpolated.



### Note

All information provided in this document is only of general nature. Each individual application must be handled as a specific case. Be sure to always follow all national installation regulations/codes for your specific application.



### More information

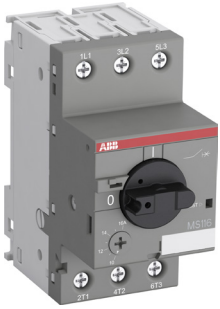
For more information about manual motor starters as well as other ABB products please visit:

[www.new.abb.com/low-voltage/products/motor-protection](http://www.new.abb.com/low-voltage/products/motor-protection)

<sup>1)</sup> Temperature compensation applies to bi-metallic devices which employ a secondary bi-metal to counteract the bi-metals of the inverse time-delay overcurrent release. The secondary bi-metal is not heated by the motor current, instead it reacts only under the influence of the ambient air temperature. As a result, the effect of the ambient temperature on the tripping behavior of the manual motor starter is automatically compensated within the limits acc. to the product standard (for the temperature range -5°C to 40°C) or the product specification (for the extended temperature range. -25 °C ... 60 °C / 70 °C).

<sup>2)</sup> Derating in this case aims at ensuring that the product is prevented from heating up to temperatures above the design limit, thereby providing relevant protection in operating conditions for the device. By applying derating in an electrical or electronic component, its' degradation rate is reduced. The reliability and life time expectancy are ensured. Intuitively, if an electrical device is operated below its' design limit, it will be more reliable than if it is operated at or above the design limit.

# MS116



MS116

## Deratings for IEC applications - mounting with distance $\geq 9$ mm

	40 °C	55 °C	70 °C
MS116-0.16	0.16 A	0.16 A	0.16 A
MS116-0.25	0.25 A	0.25 A	0.25 A
MS116-0.4	0.40 A	0.40 A	0.40 A
MS116-0.63	0.63 A	0.63 A	0.63 A
MS116-1.0	1.00 A	1.00 A	1.00 A
MS116-1.6	1.60 A	1.60 A	1.60 A
MS116-2.5	2.50 A	2.50 A	2.50 A
MS116-4.0	4.00 A	4.00 A	4.00 A
MS116-6.3	6.30 A	6.30 A	6.30 A
MS116-10	10.0 A	10.0 A	8.00 A
MS116-12	12.0 A	12.0 A	10.0 A
MS116-16	16.0 A	16.0 A	12.0 A
MS116-20	20.0 A	20.0 A	18.0 A
MS116-25	25.0 A	25.0 A	23.0 A
MS116-32	32.0 A	32.0 A	29.0 A

## Deratings for IEC applications - group mounting (side by side, distance 0 mm)

	40 °C	55 °C	70 °C
MS116-0.16	0.16 A	0.16 A	0.16 A
MS116-0.25	0.25 A	0.25 A	0.25 A
MS116-0.4	0.40 A	0.40 A	0.40 A
MS116-0.63	0.63 A	0.63 A	0.63 A
MS116-1.0	1.00 A	1.00 A	1.00 A
MS116-1.6	1.60 A	1.60 A	1.60 A
MS116-2.5	2.50 A	2.50 A	2.50 A
MS116-4.0	4.00 A	4.00 A	4.00 A
MS116-6.3	6.30 A	6.30 A	5.00 A
MS116-10	10.0 A	9.00 A	7.00 A
MS116-12	12.0 A	11.0 A	9.00 A
MS116-16	16.0 A	13.5 A	11.5 A
MS116-20	20.0 A	19.0 A	17.0 A
MS116-25	25.0 A	23.0 A	20.0 A
MS116-32	32.0 A	30.0 A	25.0 A

# MS132 / MO132



MS132



MO132

**Deratings for IEC applications - mounting with distance ≥ 9 mm**

	40 °C	60 °C	70 °C
MS132-0.16	0.16 A	0.16 A	0.16 A
MS132-0.25	0.25 A	0.25 A	0.25 A
MS132-0.4	0.40 A	0.40 A	0.40 A
MS132-0.63	0.63 A	0.63 A	0.63 A
MS132-1.0	1.00 A	1.00 A	1.00 A
MS132-1.6	1.60 A	1.60 A	1.60 A
MS132-2.5	2.50 A	2.50 A	2.50 A
MS132-4.0	4.00 A	4.00 A	4.00 A
MS132-6.3	6.30 A	6.30 A	6.30 A
MS132-10	10.0 A	10.0 A	8.00 A
MS132-12	12.0 A	12.0 A	11.0 A
MS132-16	16.0 A	16.0 A	13.0 A
MS132-20	20.0 A	20.0 A	18.0 A
MS132-25	25.0 A	25.0 A	23.0 A
MS132-32	32.0 A	32.0 A	29.0 A

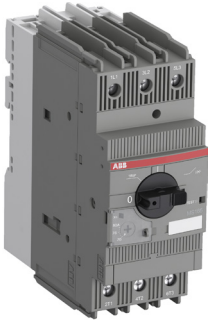
**Deratings for IEC applications - group mounting (side by side, distance 0 mm)**

	40 °C	60 °C	70 °C
MS132-0.16	0.16 A	0.16 A	0.16 A
MS132-0.25	0.25 A	0.25 A	0.25 A
MS132-0.4	0.40 A	0.40 A	0.40 A
MS132-0.63	0.63 A	0.63 A	0.63 A
MS132-1.0	1.00 A	1.00 A	1.00 A
MS132-1.6	1.60 A	1.60 A	1.60 A
MS132-2.5	2.50 A	2.50 A	2.50 A
MS132-4.0	4.00 A	4.00 A	4.00 A
MS132-6.3	6.30 A	6.30 A	5.00 A
MS132-10	9.00 A	8.00 A	7.00 A
MS132-12	12.0 A	11.0 A	10.0 A
MS132-16	15.0 A	14.0 A	13.0 A
MS132-20	20.0 A	19.0 A	17.0 A
MS132-25	25.0 A	23.0 A	20.0 A
MS132-32	32.0 A	30.0 A	25.0 A

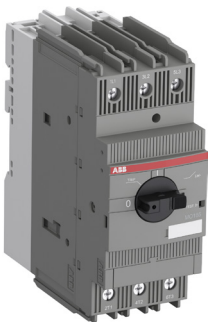
**Deratings for UL applications**

Ambient air temperature	40 °C	60 °C	70 °C
Max. rating	100 %	95 %	85 %

# MS165 / MO165



MS165



MO165

## Deratings for IEC applications - mounting with distance $\geq 9$ mm, $\geq 12$ mm and $\geq 18$ mm

	$\geq 9$ mm			$\geq 12$ mm	$\geq 18$ mm
	40 °C	60 °C	70 °C	70 °C	70 °C
MS165-16	16.0 A	16.0 A	16.0 A	16.0 A	16.0 A
MS165-20	20.0 A	20.0 A	20.0 A	20.0 A	20.0 A
MS165-25	25.0 A	25.0 A	25.0 A	25.0 A	25.0 A
MS165-32	32.0 A	32.0 A	32.0 A	32.0 A	32.0 A
MS165-42	42.0 A	42.0 A	42.0 A	42.0 A	42.0 A
MS165-54	54.0 A	54.0 A	54.0 A	54.0 A	54.0 A
MS165-65	65.0 A	65.0 A	64.0 A <sup>1)</sup>	65.0 A	65.0 A
MS165-73	71.0 A	71.0 A	71.0 A	71.5 A	73.0 A
MS165-80	76.0 A	76.0 A	76.0 A	78.5 A	80.0 A

<sup>1)</sup> with distance  $\geq 12$  mm or when 25 mm<sup>2</sup> wire is used 65 A are possible

## Deratings for IEC applications - group mounting (side by side, distance 0 mm)

	40 °C	60 °C	70 °C
MS165-16	15.0 A	14.0 A	13.0 A
MS165-20	18.0 A	17.0 A	16.0 A
MS165-25	25.0 A	23.0 A	22.0 A
MS165-32	31.0 A	30.0 A	27.0 A
MS165-42	40.0 A	38.0 A	35.0 A
MS165-54	54.0 A	47.0 A <sup>1)</sup>	44.0 A <sup>2)</sup>
MS165-65	62.0 A <sup>3)</sup>	57.0 A	53.0 A
MS165-73	65.0 A <sup>4)</sup>	65.0 A <sup>5)</sup>	- <sup>6)</sup>
MS165-80	70.0 A <sup>5)</sup>	- <sup>8)</sup>	- <sup>9)</sup>

<sup>1)</sup> with 16 mm<sup>2</sup> wire 50 A possible

<sup>2)</sup> with 16 mm<sup>2</sup> wire 47 A possible

<sup>3)</sup> with 25 mm<sup>2</sup> wire 65 A possible

<sup>4)</sup> min. wire size to be used: 25 mm<sup>2</sup>; with 35 mm<sup>2</sup> wire 73 A possible

<sup>5)</sup> min. wire size to be used: 25 mm<sup>2</sup>; with 35 mm<sup>2</sup> wire 71 A possible

<sup>6)</sup> with 35 mm<sup>2</sup> wire 65 A possible

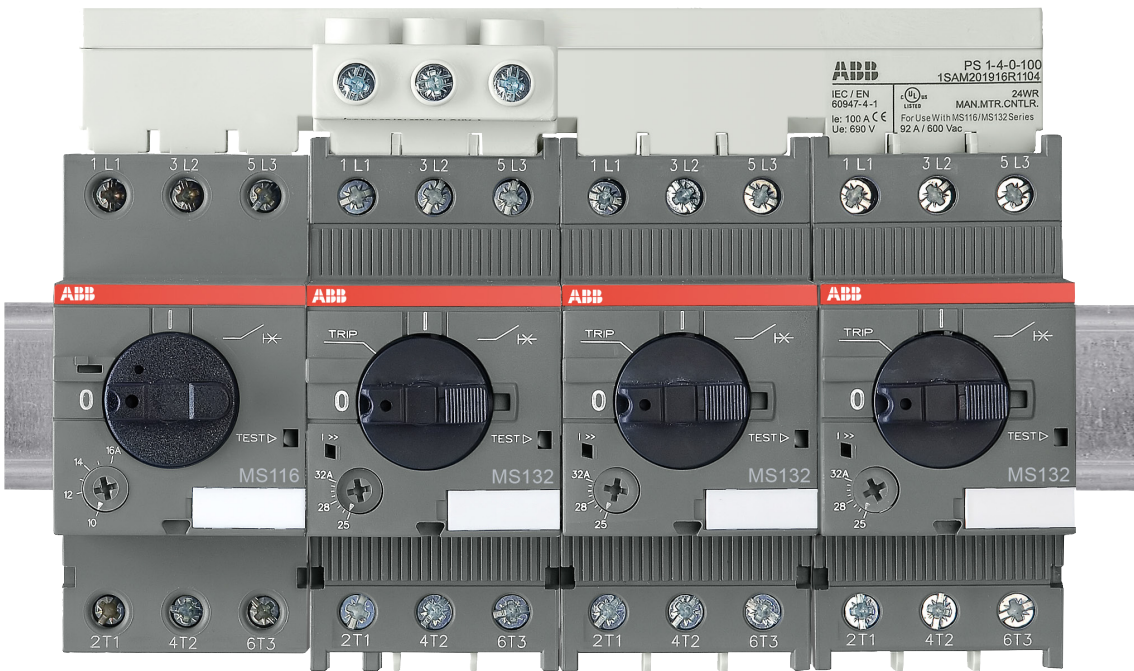
<sup>7)</sup> with 35 mm<sup>2</sup> wire 80 A possible

<sup>8)</sup> with 35 mm<sup>2</sup> wire 75 A possible

<sup>9)</sup> with 35 mm<sup>2</sup> wire 72 A possible

# Group mounting examples

Group mounting, distance 0 mm



Group mounting, distance according to tables on previous pages



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